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Case No. N0069US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	
Rajashri Joshi	Examiner Miranda Le
Serial No. 09/706,926	Group Art Unit No. 2159
Filing Date: November 6, 2000	
For: METHOD AND SYSTEM FOR WAVELET-BASED REPRESENTATION AND USE OF CARTOGRAPHIC DATA	

APPEAL BRIEF (37 CFR § 41.37)

Mail Stop: Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in accordance with 37 CFR § 41.37 and is filed in furtherance of the Notice of Appeal filed November 8, 2010.

I. Real Party in Interest

The real party in interest is NAVTEQ North America, LLC (formerly Navigation Technologies Corporation), a wholly-owned, indirect subsidiary of Nokia Corporation, a publicly-traded corporation that has its headquarters in Finland.

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II. Related Appeals and Interferences

There are no pending appeals, interferences, or judicial proceedings that may be related to, directly effect, or be directly affected by or have bearing on the Board's decision in this appeal.

III. Status of Claims

A. Claims 1, 3, 4 and 6-10 are present and pending in the application. Claims 2, 5 and 11-27 have been previously canceled.

B. Claims 1, 4 and 7 have been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over US Pat. No. 6,108,609 (Qian), US Pat. No. 5,541,592 (Shiihara), US Pat. No. 5,966,672 (Knupp), US Pat. No. 5,663,929 (Pavone) and US Pat. No. 6,882,997 (Zhang). Claim 3 has been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Qian, Shiihara, Knupp, Pavone and US Pat. No. 5,978,788 (Castelli). Claim 6 has been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Qian, Shiihara, Knupp, Pavone and US Pat. No. 6,243,483 (Petrou). Claims 8-10 have been finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Qian, Shiihara, Knupp, and Pavone.

C. The rejections of claims 1, 3, 4 and 6-10 are being appealed.

IV. Status of Amendments

There has been no amendment filed subsequent to the final rejection of July 7, 2010.

V. Summary of Claimed Subject Matter

There are two (2) independent claims involved in this appeal: Claims 1 and 8. In addition, there are six (6) dependent claims involved in this appeal: Claims 3, 4, 6, 7 and 9-10.

Independent claim 1 relates to a method for representing cartographic data in a computer-based system (*e.g.*, Figure 5 (reference 50); page 11, lines 5-8). The method includes providing a cartographic database containing a sequence of latitude and longitude data points indicating locations along a geographic feature, wherein the sequence of latitude and longitude data points provide a data point representation of the geographic feature (*e.g.*, Figure 4 (references 24, 28, 30, 31); page 10, lines 4-24; Figure 5 (reference 52); page 11, lines 28-29). Another step of the method is using the latitude and longitude data points to generate a parameterized function representing the geographic feature (*e.g.*, page 9, lines 7-14). The method further includes computing a plurality of wavelet coefficients from the parameterized function representing the geographic feature (*e.g.*, Figure 5 (reference 56)), wherein the wavelet coefficients obtained with a wavelet, wherein the wavelet being one of a family of functions having a form $\psi_{ab}(x)=|a|^{-1/2}\psi\left(\frac{x-b}{a}\right)$, wherein $\psi_{ab}(x)$ is called a mother wavelet, a is called a dilation parameter, b is called a translation parameter, and x is an independent variable (*e.g.*, page 4, lines 12-18), wherein the computing the wavelet coefficients includes applying a wavelet transform to the parameterized function defined by the data points representing the geographic feature (*e.g.*, page 9, lines 17-21; page 12, lines 1-16). Another step of the method is assigning each of the computed wavelet coefficients to at least one of a plurality of display scales for a map display (*e.g.*, page 11, lines 12-13, page 13, lines 16-22). The method also includes indexing the wavelet coefficients by the assigned display scales for the map display (*e.g.*, page 11, lines 12-13, page 13, lines 16-22). Another step of the method is after said step of computing, storing the

wavelet coefficients in a computer-usable database on a physical storage medium to provide a wavelet-based representation of the geographic feature, wherein the wavelet-based representation has a smaller data size than the data point representation of the geographic feature (*e.g.*, Figure 4 (reference 26); Figure 5 (reference 58); page 12, lines 17-23).

Independent claim 8 relates to a method of displaying on a computer output device a representation of a geographic feature (*e.g.*, Figure 7 (reference 120); page 12, lines 24-27; page 13, lines 14-15). The method includes identifying a display scale for displaying the representation of the geographic feature, wherein the display scale is one of several display scale levels useable for a zooming operation of a map display (*e.g.*, Figure 7 (reference 122); page 13, lines 14-18). Another step of the method is retrieving from a computer-usable database a plurality of wavelet coefficients associated with the geographic feature at the identified display scale (*e.g.*, Figure 7 (reference 124); page 13, lines 19-22), wherein a wavelet being one of a family of functions having a form $\psi_{ab}(x) = |a|^{-1/2}\psi\left(\frac{x-b}{a}\right)$, wherein $\psi_{ab}(x)$ is called a mother wavelet, a is called a dilation parameter, b is called a translation parameter, and x is an independent variable (*e.g.*, page 4, lines 12-18), the wavelet coefficients being derived from a plurality of latitude and longitude data points specifying geographic locations on the geographic feature (*e.g.*, Figure 5 (reference 56); page 12, lines 1-13; page 12, lines 17-23), wherein the plurality of latitude and longitude data points provide a data point representation of the geographic feature (*e.g.*, Figure 4 (references 24, 28, 30, 31); page 10, lines 4-24), wherein the derived wavelet coefficients provide a wavelet-based representation of the geographic feature, wherein the wavelet-based representation has a smaller data size than the data point representation of the geographic feature (*e.g.*, Figure 4 (reference 26); Figure 5 (reference 58); page 12, lines 17-23), wherein each of the wavelet coefficients are assigned to at least one of the

of display scale levels (*e.g.*, page 11, lines 12-13, page 13, lines 16-22). The method further includes generating a parameterized function representing the geographic feature at the display scale using the retrieved wavelet coefficients (*e.g.*, Figure 7 (reference 126); page 13, line 22 – page 14, line 3). Another step of the method is displaying a line on the computer output device corresponding to the parameterized function representing the geographic feature at the display scale (*e.g.*, Figure 7 (reference 128); Figure 6 (reference 106); page 14, lines 2-4).

Dependent Claim 3 recites that the data points described in independent base Claim 1 include altitude (*e.g.*, page 9, lines 7-10). Dependent Claim 4 recites that the geographic feature described in independent base Claim 1 is the boundary of a feature selected from the group consisting of a road, waterway, building, park, lake, railroad track, and airport (*e.g.*, page 1, lines 11-14). Dependent Claim 10 recites that the geographic feature described in independent base Claim 8 is selected from the group consisting of a road, waterway, building, park, lake, railroad track, and airport (*e.g.*, page 1, lines 11-14).

Dependent Claim 6 recites that the step of computing the wavelet coefficients recited in independent base Claim 1 includes computing the wavelet coefficients by performing a least-squares fit (*e.g.*, page 12, lines 13-14). Dependent Claim 7 recites that the wavelet coefficients described in independent base Claim 1 are computed using a semi-discrete orthonormal wavelet transform (*e.g.*, page 5, lines 16-18). Dependent Claim 9 recites that the method of claim 8 further includes performing the zooming operation to display another representation of the geographic feature at a different scale level by retrieving the wavelet coefficients associated with the geographic feature at the different display scale (*e.g.*, page 14, lines 5-18).

VI. Grounds of Rejection to be Reviewed on Appeal

A. At issue is whether Appellant's claims 1, 4 and 7 are obvious and unpatentable under 35 U.S.C. § 103(a) in view of US Pat. No. 6,108,609 (Qian), US Pat. No. 5,541,592 (Shiihara), US Pat. No. 5,966,672 (Knupp), US Pat. No. 5,663,929 (Pavone) and US Pat. No. 6,882,997 (Zhang);

B. At issue is whether Appellant's claim 3 is obvious and unpatentable under 35 U.S.C. § 103(a) in view of Qian, Shiihara, Knupp, Pavone and US Pat. No. 5,978,788 (Castelli).

C. At issue is whether Appellant's claim 6 is obvious and unpatentable under 35 U.S.C. § 103(a) in view of Qian, Shiihara, Knupp, Pavone and US Pat. No. 6,243,483 (Petrou).

D. At issue is whether Appellant's claims 8-10 are obvious and unpatentable under 35 U.S.C. § 103(a) in view of Qian, Shiihara, Knupp, and Pavone.

VII. Argument

A. Claims 1, 4 and 7 are not obvious in view of the combination of Qian, Shiihara, Knupp, Pavone and Zhang.

Appellant's independent Claim 1 relates to a method for generating a wavelet-based representation of cartographic data, such as data representing roads, by transforming latitude and longitude data point representation into the wavelet-base representation. Claim 1 recites "using the latitude and longitude data points to generate a parameterized function representing the geographic feature" and "computing a plurality of wavelet coefficients from said parameterized function representing the geographic feature." In the Office Action, Appellant's independent Claim 1 was rejected as being obvious in view of the combination of Qian, Shiihara, Knupp,

Pavone and Zhang. Claim 1 is not obvious in view of the combination of Qian, Shiihara, Knupp, Pavone and Zhang because these references fail to disclose or suggest these claim elements.

The Office Action stated that Qian teaches the claim element of computing a plurality of wavelet coefficients from the parameterized function representing the geographic feature. (See, Office Action: page 4). The Office action further stated that Qian implies the claim element of using the latitude and longitude data points to generate the parameterized function and stated that Shiihara taught this limitation. (See, Office Action: pages 6-7). However, Qian and Shiihara, as well as Knupp, Pavone and Zhang, fail to disclose these claim elements.

The Qian patent describes a system for designing a mother wavelet for use in wavelet analysis. (See, Qian: Abstract, lines 1-2; column 9, lines 53-56). Although Qian discusses computing wavelet coefficients, Qian discloses computing wavelet coefficients in a in a totally different manner than recited by the claimed invention. That is, Qian uses 2D image data, such as that of Figure 29, to compute the wavelet coefficients, (See, Qian: col. 19, lines 10-16), not the Applicant's recited parameterized function generated from the latitude and longitude data points. The Office Action cited the sentence at column 20, lines 58-62 of Qian as disclosing the above recited claim element, the sentence is reproduced for convenience: "Wavelet analysis can be used for a variety of functions, including detecting the discontinuity of a signal, removing the trend of a signal, suppressing noise, and compressing data." This disclosure of Qian does not support computing wavelet coefficients from the parameterized function representing the geographic feature; rather, it merely indicates the various uses of wavelet analysis not how to compute the wavelet coefficients. Simply, the Qian patent discloses using 2D image data to compute the wavelet coefficients; Qian does not disclose the claim element of computing a

plurality of wavelet coefficients from the parameterized function representing the geographic feature.

Furthermore, Qian does not teach or imply the claim element of using the latitude and longitude data points to generate a parameterized function representing the geographic feature. Qian has no disclosure related to generating the parameterized function from latitude and longitude data points. The Office Action cited the sentences at column 20, lines 52-57 of Qian as implying this claim element, the sentence is reproduced for convenience: "These variables simultaneously change as the user changes the design. If the user incorporates those parameters into his own application, the user can see the effect of the different design. FIG. 33 illustrates how LabVIEW uses these two parameters to implement a Wavelet Packet similar to the one displayed in FIG. 32, Wavelet Packet." This disclosure of Qian does not imply generating a parameterized function using latitude and longitude data points; rather, it merely teaches using filter coefficients to change the design for the mother wavelet. The Qian patent has no disclosure related to generating the parameterized function from latitude and longitude data points.

The Shiihara patent describes a positioning system for a navigation system that uses map data. (See, Shiihara: col. 1, lines 59-62). The Office Action pointed to Figures 3-5 of Shiihara as teaching the claim element of using the latitude and longitude data points to generate a parameterized function representing the geographic feature. (See, Office Action, page 7). Although Shiihara discloses roads being representing with latitude and longitude data points, Shiihara does not teach using the latitude and longitude data points in the manner recited by Claim 1. Rather, Shiihara teaches a travel route as a series of latitude and longitude points and uses these points to determine vehicle position. (See, Shiihara: col. 4, lines 31-47). Shiihara

does not generate a parameterized function using its disclosed latitude and longitude data points. Additionally, Shiihara has no disclosure relating to wavelets or computing wavelet coefficients.

Moreover, the other cited references of Knupp, Pavone and Zhang fail to teach or suggest the claim elements of "using the latitude and longitude data points to generate a parameterized function representing the geographic feature" and "computing a plurality of wavelet coefficients from said parameterized function representing the geographic feature."

The claim element of computing a plurality of wavelet coefficients from the parameterized function that was generated from latitude and longitude data points that is missing in Qian, Shiihara, Knupp, Pavone and Zhang is not a familiar element in the prior art. Moreover, this claim element -- that is missing from the cited prior art -- provides an unexpected result for the claimed invention. That is, the computed wavelet coefficients provide a wavelet-based representation of the geographic feature that has a smaller data size than the data point representation of the geographic feature. Rather than representing the shape of geographic features, such as roads, as a sequence of latitude and longitude data points, the recited invention allows the roads to be modeled and represented by wavelet coefficients. This wavelet-based representation provides an efficient data model for the geographic features that requires less computer readable storage space than the traditional latitude and longitude data point representation.

Accordingly, for at least these reasons, independent Claim 1 and dependent Claims 4 and 7 which depend upon Claim 1 are not obvious in view of the combination of Qian, Shiihara, Knupp, Pavone and Zhang.

B. Claim 3 is not obvious in view of the combination of Qian, Shiihara, Knupp, Pavone and Castelli.

Appellants' dependent Claim 3 is allowable at least for the reason that it depends upon an allowable base claim.

C. Claim 6 is not obvious in view of the combination of Qian, Shiihara, Knupp, Pavone and Petrou.

Appellants' dependent Claim 6 is allowable at least for the reason that it depends upon an allowable base claim. Additionally, Claim 6 recites the claim element of "computing the wavelet coefficients by performing a least-squares fit" that is not taught or suggested by the cited references.

The Petrou patent describes a system that enables pipeline surveillance. (See, Petrou: Abstract). Petrou discloses fitting a line to pixels in an image representing the pipeline using least squares fit. (See, Petrou: column 14, lines 14-16). Although Petrou discloses using least squares fit, Petrou does not teach computing the wavelet coefficients by performing a least-squares fit; it merely fits a straight line through pixel data points. Petrou has no disclosure relating to computing wavelet coefficients. One of ordinary skill in the art knows that fitting a straight line through pixel data points does not teach or suggest computing the wavelet coefficients.

Accordingly, for at least these reasons, dependent Claim 6 is not obvious in view of the combination of Qian, Shiihara, Knupp, Pavone, Zhang and Petrou.

D. Claims 8-10 is not obvious in view of the combination of Qian, Shiihara, Knupp and Pavone.

Appellant's independent Claim 8 relates to a method of displaying on a computer output device a representation of a geographic feature. The geographic feature, such as a road, is displayed using a wavelet-base representation from a database. Claim 8 recites "retrieving from a computer-usable database a plurality of wavelet coefficients associated with the geographic feature at the identified display scale, ... the wavelet coefficients being derived from a plurality of latitude and longitude data points specifying geographic locations on the geographic feature" and "generating a parameterized function representing the geographic feature at the display scale using the retrieved wavelet coefficients." In the Office Action, Appellant's independent Claim 8 was rejected as being obvious in view of the combination of Qian, Shiihara, Knupp and Pavone. Claim 8 is not obvious in view of the combination of Qian, Shiihara, Knupp and Pavone because these references fail to disclose or suggest these claim elements.

The Office Action stated that Qian teaches the claim elements of the wavelet coefficients being derived from a plurality of latitude and longitude data points specifying geographic locations on the geographic feature and generating a parameterized function representing the geographic feature at the display scale using the retrieved wavelet coefficients. For support for this position, the Office Action cited the sentences at column 20, lines 52-57 of Qian as implying this claim element, the sentence is reproduced for convenience: "These variables simultaneously change as the user changes the design. If the user incorporates those parameters into his own application, the user can see the effect of the different design. FIG. 33 illustrates how LabVIEW uses these two parameters to implement a Wavelet Packet similar to the one displayed in FIG. 32, Wavelet Packet." (See, Office Action: page 11). This disclosure of Qian does not teach or

imply the wavelet coefficients being derived from a plurality of latitude and longitude data points and using the wavelet coefficients to generating a parameterized function; rather, it merely teaches using filter coefficients to change the design for the mother wavelet. Simply, the Qian patent has no disclosure related using the wavelet coefficients to generating a parameterized function. Although Qian discusses computing wavelet coefficients, Qian discloses computing wavelet coefficients in a in a totally different manner than recited by the claimed invention. That is, Qian uses 2D image data, such as that of Figure 29, to compute the wavelet coefficients, (See, Qian: col. 19, lines 10-16), not the Applicant's recited latitude and longitude data points.

The Office Action pointed to Figures 3-5 of Shiihara as teaching the claim element of generating a parameterized function representing the geographic feature at the display scale using the retrieved wavelet coefficients. (See, Office Action, page 14). Shiihara has no disclosure relating computing wavelet coefficients. The Shiihara patent describes a positioning system for a navigation system that uses a travel route as a series of latitude and longitude points to determine vehicle position. (See, Shiihara: col. 4, lines 31-47). The system of Shiihara would use the latitude and longitude data points to display the roads. Accordingly, Shiihara does not disclose; rather, Shiihara teaches away from this claim element.

Moreover, the other cited references of Knupp and Pavone fail to teach or suggest the claim elements of the wavelet coefficients being derived from a plurality of latitude and longitude data points specifying geographic locations on the geographic feature" and "generating a parameterized function representing the geographic feature at the display scale using the retrieved wavelet coefficients."

The claim element of the wavelet coefficients being derived from a plurality of latitude and longitude data points specifying geographic locations on the geographic feature that is

missing in Qian, Shiihara, Knupp, Pavone and Zhang is not a familiar element in the prior art. Moreover, this claim element -- that is missing from the cited prior art -- provides an unexpected result for the claimed invention. That is, the wavelet coefficients provide a wavelet-based representation of the geographic feature that has a smaller data size than the data point representation of the geographic feature. Rather than representing the shape of geographic features, such as roads, as a sequence of latitude and longitude data points, the recited invention allows the roads to be modeled and represented by wavelet coefficients. This wavelet-based representation provides an efficient data model for the geographic features that requires less computer readable storage space than the traditional latitude and longitude data point representation.

Accordingly, for at least these reasons, independent Claim 8 and dependent Claims 9-10 which depend upon Claim 8 are not obvious in view of the combination of Qian, Shiihara, Knupp and Pavone.

Conclusion

Appellants respectfully submit that the rejections of claims 1, 3, 4 and 6-10 raised by the Examiner were in error for at least the reasons set forth above. Accordingly, reversal of all grounds of rejection is respectfully requested.

Respectfully submitted,

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VIII. Claims Appendix

1. A method for representing cartographic data in a computer-based system, comprising:

providing a cartographic database containing a sequence of latitude and longitude data points indicating locations along a geographic feature, wherein the sequence of latitude and longitude data points provide a data point representation of the geographic feature;

using the latitude and longitude data points to generate a parameterized function representing the geographic feature;

computing a plurality of wavelet coefficients from said parameterized function representing the geographic feature, wherein said wavelet coefficients obtained with a wavelet, wherein said wavelet being one of a family of functions having a form

$\psi_{ab}(x) = |a|^{-1/2}\psi\left(\frac{x-b}{a}\right)$, wherein $\psi_{ab}(x)$ is called a mother wavelet, a is called a dilation parameter, b is called a translation parameter, and x is an independent variable, wherein said computing the wavelet coefficients includes applying a wavelet transform to said parameterized function defined by the data points representing the geographic feature;

assigning each of the computed wavelet coefficients to at least one of a plurality of display scales for a map display;

indexing the wavelet coefficients by the assigned display scales for the map display; and

after said step of computing, storing the wavelet coefficients in a computer-usable database on a physical storage medium to provide a wavelet-based representation of the geographic feature, wherein the wavelet-based representation has a smaller data size than the data point representation of the geographic feature.

3. The method of claim 1, wherein the data points include altitude.

4. The method of claim 1, wherein the geographic feature is the boundary of a feature selected from the group consisting of a road, waterway, building, park, lake, railroad track, and airport.

6. The method of claim 1, wherein the step of computing the wavelet coefficients includes:

computing the wavelet coefficients by performing a least-squares fit.

7. The method of claim 1, wherein the wavelet coefficients are computed using a semi-discrete orthonormal wavelet transform.

8. A method of displaying on a computer output device a representation of a geographic feature, comprising:

identifying a display scale for displaying the representation of the geographic feature, wherein the display scale is one of several display scale levels useable for a zooming operation of a map display;

retrieving from a computer-usable database a plurality of wavelet coefficients associated with the geographic feature at the identified display scale, wherein a wavelet being one of a family of functions having a form $\psi_{ab}(x) = |a|^{-1/2}\psi\left(\frac{x-b}{a}\right)$, wherein $\psi_{ab}(x)$ is called a mother wavelet, a is called a dilation parameter, b is called a translation parameter, and x is an independent variable, the wavelet coefficients being derived from a plurality of latitude and

longitude data points specifying geographic locations on the geographic feature, wherein the plurality of latitude and longitude data points provide a data point representation of the geographic feature, wherein the derived wavelet coefficients provide a wavelet-based representation of the geographic feature, wherein the wavelet-based representation has a smaller data size than the data point representation of the geographic feature, wherein each of the wavelet coefficients are assigned to at least one of the of display scale levels;

generating a parameterized function representing the geographic feature at the display scale using the retrieved wavelet coefficients; and

displaying a line on the computer output device corresponding to the parameterized function representing the geographic feature at the display scale.

9. The method of claim 8, further comprising:

performing the zooming operation to display another representation of said geographic feature at a different scale level by retrieving the wavelet coefficients associated with the geographic feature at the different display scale.

10. The method of claim 8, wherein the geographic feature is selected from the group consisting of a road, waterway, building, park, lake, railroad track, and airport.

IX. Evidence Appendix

None

X. Related Proceedings Appendix

None